

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. Claims 12 and 18 have been amended, and Claim 19 has been cancelled without prejudice. No new matter has been added. Accordingly, Claims 1-18 and 20 remain pending in the present application, with Claims 5 and 13-16 being withdrawn from consideration.

A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Claim Rejections – 35 U.S.C. § 102

On page 2 of the Office Action, Claims 1-3, 6, and 8-11 were rejected as being anticipated by U.S. Patent No. 7,029,988 to Ohnishi et al. The Applicant also notes that the Examiner presented arguments with respect to Claim 17 on page 5 of the Office Action. For purposes of this response, the Applicant assumes that the Examiner intended to reject Claim 17 as well. The Applicant respectfully traverses the rejection of Claims 1-3, 6, 8-11, and 17.

Ohnishi et al. is not available as 35 U.S.C. § 102 prior art against Claims 1-3, 6, and 8-11 of the present application.

The present application is a Continuation-in-Part of U.S. Patent Application No. 10/389,456 (filed March 14, 2003), U.S. Patent Application No. 10/341,863 (filed January 15, 2003), U.S. Patent Application No. 10/358,966 (filed February 5, 2003), and U.S. Patent Application No. 10/341,848 (filed January 15, 2003) (referred to collectively as “the priority applications”).

The filing dates of each of the priority applications is before the May 28, 2003 filing date of U.S. Patent Application No. 10/445,927 (“the ‘927 patent”), which is the parent of Ohnishi et al. (i.e., May 28, 2003 is assumed to be the effective filing date of Ohnishi et al.).

The subject matter recited in each of Claims 1-3, 6, and 8-11 finds support in at least one of the priority applications, and as such, each of Claims 1-3, 6, and 8-11 is entitled to a priority date that is earlier than the May 28, 2003 effective filing date of Ohnishi et al.

On page 2 of the Office Action, the Examiner stated:

None of the above priority applications teach or suggest epitaxial growth of a semiconductor or metal directly in contact with the trench sidewalls and in direct contact with the silicon-germanium and strained silicon layers.

The Applicant respectfully disagrees. The Examiner is directed to Figures 16-17 and paragraphs [0068], and [0077]-[0079] of U.S. Patent Application No. 10/389,456. As clearly shown in Figure 17, conformal layer 126 is provided in the trenches and in contact with the silicon germanium substrate 114 and the strained silicon layer 116. As noted in paragraphs [0077]-[0079], the layer 126 may be deposited by CVD (as noted in paragraph [0068] and as is well known to those of ordinary skill in the art, CVD is an epitaxial process). Further, such CVD deposition is “selective” in that a masking layer 122 is provided such that the layer 126 is in contact with the substrate and strained silicon layers in only select locations. As noted in paragraph [0079], “preferably, the entire layer 126 is converted into liner oxide material 128.”

Accordingly, each and every one of the elements recited in independent Claims 1, 9, and 17 are supported by the disclosures of one or more of the priority applications.

The subject matter recited in Claim 2 (“providing an insulative material in the trenches to form the trench isolation regions”) is supported at least by the disclosure included in paragraph [0082] of U.S. Patent Application No. 10/389,456.

The subject matter recited in Claim 3 (“removing the insulative material until the mask layer is reached”) is supported at least by the disclosure included in paragraph [0083] of U.S. Patent Application No. 10/389,456.

The subject matter recited in Claim 6 (“wherein the semiconductor or metal layer includes silicon material”) is supported at least by the disclosure included in paragraph [0077] of U.S. Patent Application No. 10/389,456.

The subject matter recited in Claim 8 (“the forming oxide liners step is an oxidation process”) is supported at least by the disclosure included in paragraph [0079] of U.S. Patent Application No. 10/389,456.

The subject matter recited in Claim 10 (“providing a pad oxide layer above a strained silicon layer before the providing a hard mask layer step”) is supported at least by the disclosure included in paragraph [0069] of U.S. Patent Application No. 10/389,456.

The subject matter recited in Claim 11 (“removing the pad oxide layer at the locations before the forming trenches step”) is supported at least by the disclosure included in paragraph [0073] of U.S. Patent Application No. 10/389,456.

Because the subject matter recited in each of Claims 1-3, 6, 8-11, and 17 finds support in at least one of the priority applications, such claims are entitled to a priority date that is earlier than the effective filing date of Ohnishi et al. Accordingly, Ohnishi et al. may not form the basis of a rejection under 35 U.S.C. § 102 for Claims 1-3, 6, 8-11, and 17. Reconsideration and allowance of Claims 1-3, 6, 8-11, and 17 is therefore respectfully requested.

Claim Rejections – 35 U.S.C. § 103

1. Claims 4 and 7

On page 6 of the Office Action, Claims 4 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohnishi et al. in view of U.S. Patent No. 6,146,970 to Witek et al. The Applicant respectfully traverses this rejection.

As acknowledged by the Examiner, Ohnishi et al. does not teach or suggest an amorphous capping layer. Nevertheless, the Examiner notes that Witek et al. teaches “a capping layer of SiN or TEOS (TEOS is amorphous).” The Applicants disagree that the combination of Ohnishi et al. and Witek et al. render Claims 4 and 7 unpatentable.

First, the Examiner has not provided any support for the contention that TEOS is amorphous. Nowhere does Witek et al. disclose, teach, or suggest that TEOS is amorphous. Without some showing that it is known to those of ordinary skill in the art that TEOS is amorphous, the Examiner’s contention cannot be sustained (and, accordingly, the combination of Ohnishi et al. and Witek et al. does not teach or suggest at least one feature recited in each of Claims 4 and 7).

Second, if TEOS is amorphous by nature, the Applicant notes that this material was disclosed in at least one of the applications to which the present application claims priority. For example, the Examiner is directed to U.S. Patent No. 6,673,696 (the patent granted from U.S. Patent Application No. 10/341,848), which describes the use of TEOS at column 5, lines 62-67. As shown in Figure 7, the TEOS layer 42 is provided above pad oxide layer 18 and above a mask layer 22 that may be silicon nitride.

Accordingly:

(1) if TEOS cannot be shown by the Examiner to be amorphous, then the combination of Ohnishi et al. and Witek et al. does not teach or suggest at least one feature recited in each of Claims 4 and 7; and

(2) if TEOS can be shown by the Examiner to be amorphous, then every feature recited in Claims 4 and 7 was disclosed in at least one of the priority applications (as described above, all of the features recited in Claim 1 were disclosed in U.S. Patent Application No. 10/389,456 and all of the features recited in Claims 4 and 7 were disclosed in U.S. Patent Application No. 10/341,848). As such, Claims 4 and 7 would be entitled to an effective date that is earlier than the effective filing date of Ohnishi et al., meaning that Ohnishi et al. cannot be used as prior art in the combination under 35 U.S.C. § 103(a).

In either case, the rejection of Claims 4 and 7 over the combination of Ohnishi et al. and Witek et al. cannot be maintained. Accordingly, reconsideration and withdrawal of the rejection of Claims 4 and 7 is respectfully requested.

2. Claim 12

On page 7 of the Office Action, Claim 12 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohnishi et al. in view of GB 2 254 731 A to Cho. The Applicant respectfully traverses this rejection.

Claim 12 (as amended) recites “providing an insulative material in the trenches to form the shallow trench isolation regions; and removing the hard mask layer.”

Because all of the features recited in Claim 12 were disclosed in at least one of the applications to which the present application claims priority (see, e.g., paragraphs [0083]-[0084] of U.S. Patent Application No. 10/389,456 and the arguments presented above with respect to Claim 9, from which Claim 12 depends), Claim 12 is entitled to a priority date that is earlier than the priority date of Ohnishi et al. Accordingly, Ohnishi et al. may not be used as a reference under 35 U.S.C. § 103(a) and the rejection of Claim 12 cannot be maintained.

Reconsideration and withdrawal of the rejection of Claim 12 is respectfully requested.

3. Claims 18-20

On page 7 of the Office Action, Claims 18-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohnishi et al. in view of pages 134, 371, and 336 of Vossen. The Applicant respectfully traverses this rejection.

Claim 29 has been cancelled without prejudice and Claims 18 and 20 depend from independent Claim 17. As described above, every limitation recited in Claim 17 were previously disclosed in U.S. Patent Application No. 10/389,456. The Applicant also notes that each of the limitations recited in Claims 18-20 were also disclosed in at least one of the priority applications.

For example, the subject matter recited in Claim 18 (“the epitaxial growth is performed at a temperature below 600C”) is supported at least by the disclosure included in paragraph [0077] of U.S. Patent Application No. 10/389,456.

The subject matter recited in Claim 20 (“the oxide liner is 100-200 Å thick”) is supported at least by the disclosure included in paragraph [0077] of U.S. Patent Application No. 10/389,456.

Because all of the features recited in Claims 18 and 20 were disclosed in at least one of the applications to which the present application claims priority, Claims 18 and 20 are entitled to a priority date that is earlier than the priority date of Ohnishi et al. Accordingly, Ohnishi et al. may not be used as a reference under 35 U.S.C. § 103(a) and the rejection of Claim 12 cannot be maintained.

Reconsideration and withdrawal of the rejections of Claims 18 and 20 is respectfully requested.

* * *

It is submitted that each outstanding objection and rejection to the Application has been overcome, and that the Application is in a condition for allowance. The Applicants request consideration and allowance of all pending claims.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

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By 

FOLEY & LARDNER LLP
Customer Number: 34083
Telephone: (313) 234-7150
Facsimile: (313) 234-2800

Marcus W. Sprow
Attorney for Applicant
Registration No. 48,580